

Cellular and Molecular Biology, Block 1 Weekly Formative Questions
Week 1 (August 20-24, 2012)

Dr. Eisenmann - Introduction to Cell Biology

1. From the lumen of the rough endoplasmic reticulum, proteins to be secreted move directly to the
 - A. extracellular space.
 - B. mitochondria.
 - C. golgi apparatus.
 - D. smooth endoplasmic reticulum.
 - E. cytoplasm.
2. A medical student is investigating a response of white blood cells to the bacterial infection. He starts with microscopic investigation of the paronychia (nail infection) in a 55-year-old man. The first thing he sees is a leucocyte propelling the membrane at its leading edge. The student is fascinated and asks you how it happens.

Question:

How will you explain phagocytosis in terms of basic active mechanism underlying this first movement of the leading edge?

- A. Traction Force
- B. Stall Force
- C. Actin Polymerization
- D. Active Transport
- E. Retraction

Dr. Eisenmann - Cell Structure and Function

3. Cytokinesis is defined as the stage at which the
 - A. two daughter cells are formed.
 - B. two nuclei reform.
 - C. chromosomes decondense.
 - D. homologous chromosomes pair and condense.
 - E. mitotic spindle forms.
4. Microtubules are important for
 - A. nucleolar RNA protein synthesis.
 - B. regulation of transit across the nuclear envelope.
 - C. contraction of cells.
 - D. chromosomes movement during mitosis.
 - E. red blood cell contractile activity.

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Dr. Williams - Introduction to Proteins: Part 1

5. Hydrogen bonds are usually _____ than covalent bonds (choose correct answer for blank)
- A. longer
 - B. shorter
 - C. equal in length
 - D. stronger
6. What charged group(s) is(are) present in glycine at a neutral pH?
- A. NH_3^+
 - B. COO^-
 - C. NH_2^+
 - D. A and B
 - E. A, B, and C

Dr. Williams - Introduction to Proteins: Part 2

7. The configuration of most alpha-carbon atoms of amino acids linked in a peptide bond is
- A. cis.
 - B. circular.
 - C. parallel.
 - D. trans.
 - E. perpendicular.
8. The pathogenesis of prion disease is attributed to a change in the secondary structure of the prion protein, resulting in irreversible aggregation, leading to neurodegeneration and eventual death. Secondary structure of polypeptide chains
- A. is the spatial arrangement of amino acid residues that are far apart in sequence.
 - B. cannot be predicted based upon amino acid sequence.
 - C. consist primarily of two regularly repeating (periodic) secondary structures.
 - D. is none of the above.

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Dr. Williams - Introduction to Proteins: Part 3

9. How do proteins find the correct conformation?
- A. Cooperative transition
 - B. Cumulative selection by progressive stabilization of intermediates
 - C. Random interactions
 - D. A, B and C
 - E. A and B
10. When purifying enzymes, the assay for specific activity is often based on
- A. ultracentrifugation.
 - B. catalytic activity (measurement of end product).
 - C. pH.
 - D. temperature changes.
 - E. salt changes.

Dr. Cicila - Blood

11. Hematopoietic stem cells
- A. are pluripotent.
 - B. can not divide.
 - C. produce only one type of cells.
 - D. are completely differentiated cells.
12. Which one of the following class(es) of major histocompatibility complex molecules (MHC) can present antigen to helper T-cells?
- A. MHC I
 - B. MHC II
 - C. MHC III
 - D. Both MHC I and MHC II

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Dr. Smas - Plasma Membrane 1

13. Which of the following interactions are not involved in assembly of the phospholipid bilayer?
- A. Van der Waals
 - B. Covalent bonds between phosphate head groups
 - C. Hydrophobic interactions
 - D. Hydrogen bonds
 - E. Electrostatic interactions
14. In the interactions of the red blood cell membrane with cytoskeleton, which glycoprotein is an integral membrane protein with a single membrane spanning alpha-helix and is the basis for the MN blood group?
- A. Spectrin
 - B. Fibronectin
 - C. Glycophorin
 - D. Band 4.1
 - E. Ankyrin

Dr. Smas - Plasma Membrane 2

15. During routine physical examination and laboratory testing on a 350 lb. 5'6" male you are concerned to find extremely elevated fasting glucose levels and elevated plasma insulin levels. These and other tests confirm a diagnosis of non-insulin dependent (Type II) diabetes and you decide to start him on a TZD drug. The mode of function of the membrane transport protein that is important for insulin-stimulated glucose uptake in adipose tissue is
- A. secondary active transport.
 - B. primary active transport.
 - C. facilitated diffusion.
 - D. an ion pump.
 - E. a ligand-gated channel.

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16. A 50 year old woman has been experiencing extreme fatigue for several months and has noticed intermittent swelling of her ankles and shortness of breath upon minor exertion. Blood tests indicate a lack of anemia. Additional echocardiogram testing indicated poor heart function with a markedly reduced ejection fraction of 20%. You are considering prescribing a cardiotonic steroid drug to increase heart function. Cardiotonic steroids directly exert their function by inhibiting which class of membrane protein?
- A. Ligand-gated ion channel
 - B. ABC-Type transporter
 - C. Facilitative transporter
 - D. Voltage-gated ion channel
 - E. A P-type ATPase ion pump

Dr. Crissman - Epithelial Tissues

17. Select the **CORRECT** statement about epithelium.
- A. The composition of apical membrane in epithelia is exactly the same as the basolateral membrane.
 - B. Stereocilia are used to move spermatozoa through the male reproductive system.
 - C. The secretory units of a compound tubuloacinar gland has a basement membrane surrounding it.
 - D. All alveolar-shaped secretory units secrete by holocrine secretion mode.
 - E. Desmosomes use the transmembrane linker protein, integrin, to hold the adjacent cell membranes together.
18. Pemphigus vulgaris is an autoimmune disease that destroys
- A. zona occludens.
 - B. desmosomes.
 - C. connexons.
 - D. dynein in cilia.
 - E. none of the above.

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Dr. de la Serna - Cell Cycle

19. Analysis of a tumor cell line indicates that there is a dramatically increased level in the activity of the transcription factor E2F. Which of the following statements about the retinoblastoma protein (Rb) is the most likely explanation for this observation?
- A. An increase in the expression of RB resulting in increased binding of RB to E2F.
 - B. Hypo-phosphorylation of RB so that it can no longer interact with E2F.
 - C. Loss of expression of RB which normally activates E2F.
 - D. Mutation in RB that prevents its phosphorylation so that it cannot interact with the gene to which it normally binds and coactivates with E2F.
 - E. Mutation in the domain of RB to which E2F binds, the consequences of which lead to constitutive E2F activity.
20. When dividing cells are progressing through the cell cycle many checks are imposed to ensure that the process is occurring with fidelity. A critical check-point in the cell cycle occurs in response to DNA damage, such as that induced by ultraviolet light. Which of the following cell cycle proteins is involved in DNA damage-mediated cell cycle arrest?
- A. CDK2
 - B. Cyclin A
 - C. Cyclin D
 - D. E2F
 - E. P53

(See next page for answers)

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Instructor	Question	Answer
Dr. Eisenmann	1	C
	2	C
	3	A
	4	D
Dr. Williams	5	A
	6	D
	7	D
	8	C
	9	E
	10	B
Dr. Cicila	11	A
	12	B
Dr. Smas	13	B
	14	C
	15	C
	16	E
Dr. Crissman	17	C
	18	B
Dr. de la Serna	19	E
	20	E